FORT POLK EEAP

July 17, 1986

AREA inc

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
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REPLY TO
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July 17, 1986

Mr. Roger R. Anderson, PE, Authorized Representative of the Contracting Officer, Military Branch, US Army Corps of Engineers, Fort Worth District, PO Box 17300, Fort Worth, TX 76102-0300

ATTN: SWFED-MF
Mr. Anthony Morrow

RE: Energy Engineering Analysis Program
Increments A,B,E, and G
Fort Polk, Louisiana
Contract No. DACA63-80-C-0166

MR. ANDERSON, We are pleased to present this brief summary of the work accomplished by the CRS/AREA team at Fort Polk, LA under referenced contract.

As you are aware, key AREA inc personnel served as officers of CRS prior to starting our own venture. Regardless of company affiliation, we have provided comprehensive analytical and engineering services to the Installation at Fort Polk during the last five years. Even as we are making this final overview presentation, projects we have identified and developed as ECIP's have already been funded and implemented.

Energy conservation is a continuing process, and we sincerely hope that our work has enhanced the performance of the Installation in this area. While many elements in this country have unfortunately forgotten the recent energy crisis, we commend the federal government for its long term commitment to energy conservation through the implementation of cost effective, energy saving projects and programs.

We appreciate the opportunity to be of service to the Corps of Engineers and Fort Polk. Furthermore, we are eagerly looking forward to the next project on which we can be of beneficial assistance to the Corps.

Sincerely yours,

T. T. Shishman

Thomas T. Shishman
Project Director

Encl

John W. Focke
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ENERGY ENGINEERING ANALYSIS PROGRAM

FORT POLK, LOUISIANA

FINAL PRESENTATION
JULY 17, 1986

ROBERT D. BUSCH, Ph.D, PE

KARL E. SCHEUCH, PE

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INTRODUCTION

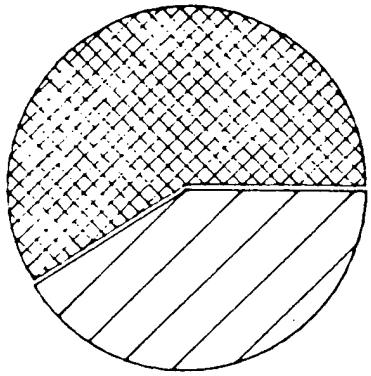
This Final Presentation provides a summary of the work done under Increments A, B, E, and G of the Energy Engineering Analysis Program (EEAP) for Fort Polk Louisiana. The work was accomplished under Contract DACA63-80-C-0166 plus modifications with the Fort Worth District, Corps of Engineers.

BACKGROUND

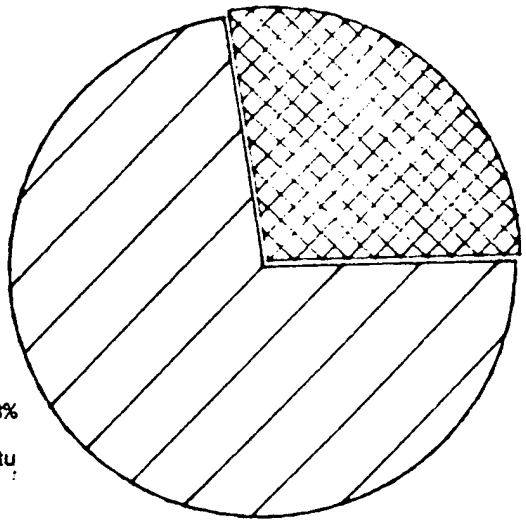
The vast majority of consumed energy at Fort Polk consists of electricity and natural gas. In FY75, Fort Polk used 48,399,000 kWh of electricity at a cost of $600,000. During that same period, 782,637 MCF of natural gas was purchased for $484,000. The total FY75 energy use was 1,368,327 MBtu.

A significant increase in electricity was noted by FY83 with 147,378,000 kWh used at a cost of over $6.7 million. Much of the increase in consumption was due to a substantial increase in building square footage as a result of multiple construction projects. During this same period, 622,934 MCF of natural gas were purchased for over $3.1 million. The total FY83 energy use was 2,351,830 MBtu (see Figure ES1).

The consumption of energy will continue to increase not due to poor energy practices as much as it is due to increased square footage and the increased use of air conditioning. Even on a per square footage basis, the amount of energy use at Fort Polk has increased since FY75 due to the use of mechanical refrigeration for air conditioning in new structures. Note that the increase is from increased electric use - natural gas consumption has actually decreased due to newer construction being more thermally conserving. Therefore, Fort Polk's use of energy today is not simply related to increased use or square footage but to a distinct change in the building stock and interior conditions in newer structures.



FY 75
TOTAL SOURCE ENERGY
1,368,327 MBtu



FY 83
TOTAL SOURCE ENERGY
2,351,830 MBtu

Figure ES1 Comparison of FY75 and FY83 Energy Consumption

ENERGY CONSERVING MEASURES

There were 34 Energy Conserving Measures (ECMs) analyzed for applicability to Fort Polk. These are divided into three categories: ECMs for Non-Family Housing, ECMs for Family Housing, and ECMs for Electric Utility. The following are the ECMs analyzed; those with an asterisk met ECIP criteria and were packaged as such.

Non-Family Housing

* Roof Insulation
* Automatic Setback Thermostats
* Flow Restricting Showerheads in Barracks & BOQs

  Domestic Hot Water Tank Insulation
* Turbulators in Fire Tube Boilers
* Flue Gas Analyzers with Feedback Trim

Family Housing

* Automatic Setback Thermostats
* Flow Restricting Showerheads
* Domestic Hot Water Heater Insulation
* Conversion from Incandescent Lighting to Fluorescent Lighting in Kitchens

  Storm Windows

  Solar Domestic Hot Water Systems

  Floor Insulation

  Wall Insulation

  Roof Insulation

  Automatic Setback Thermostats in new Family Housing

  Water Heater Insulation Jackets in new Family Housing

  DHW Heat Pumps

  Electronic Furnace Ignition

  Powered Attic Ventilation

  Wind Driven Attic Ventilation
* Family Housing Automatic Thermostat Override
* Restricted Flow Showerheads in new Family Housing
* FM Controls for Family Housing Air Conditioning Units

Utilities

* Conversion of Existing Incandescent Athletic Flood Lights to High-Efficiency Luminaires
* Energy Monitoring and Control System - South Fort
* Energy Monitoring and Control System - North Fort

Transformer Replacement

Replacement of Overhead Conductors

Electric Demand Reduction

Conversion to High-Efficiency Motors in Water Pumping

Conversion to High-Efficiency Motors in Sanitary Disposal System

Conversion of Existing Mercury Vapor Lamps in Street Lighting to High-Pressure Sodium Lamps

Conversion of Existing Incandescent Lamps in Street Lighting to High-Pressure Sodium Lamps

ENERGY CONSERVATION INVESTMENT PROGRAM

At the request of the installation, seven Energy Conservation Investment Program (ECIP) packages were prepared containing the qualifying ECMs. These ECIPs are listed below with the associated SIRs (one package was submitted under the old B/C criteria):

T-100	Non-Family Housing Load Reduction	SIR = 3.54
T-101	Non-Family Housing Controls	SIR = 1.70
T-102	Boiler Alterations	SIR = 3.77
T-103	EMCS - South Fort	SIR = 2.55
T-104	Conversion of Athletic Field Lighting	SIR = 1.55
T-105	FM Controls for Family Housing	SIR = 1.57
-----	Original Family Housing Package	B/C = 2.80

INCREMENT E

The use of waste POL as a fuel source is the only project analyzed under Increment E which shows promise. The detailed analysis indicated a negative Net Life Cycle Cost that was sufficiently large enough (-$1,439,000) to remove doubts about limits on its feasibility. This project involved adding a waste POL burner to two boilers. Along with the fuel oil already used, the waste POL could provide up to 25% of the energy output required from this boiler plant. Actually, no energy will be saved since the waste POL is replacing fuel oil, but the waste POL is not charged against the Fort so the total MBtu usage would be reduced by about 18,700 MBtu/yr with this project.

INCREMENT G

Four projects which did not meet ECIP criteria under Increment A were examined under Increment G. Additional analyses indicated that these four projects would not qualify for implementation under Increment G. The four projects and associated SIRs are:

DHW Heat Pumps for Family Housing	SIR = 0.84
Electronic Furnace Ignition	SIR = 0.56
Powered Attic Ventilation	SIR = - savings
Wind Driven Attic Ventilation	SIR = 0.50

RESULTS

The totals for the implementation of the ECM's meeting ECIP criteria are shown in TABLE ES1 and are summarized below:

Energy Savings:	88,427	MBtu/yr (source) Electric
	51,093	MBtu/yr Natural Gas
	+ 7,811	MBtu/yr Fuel Oil
Total Energy Savings:	147,331	MBtu/yr (source) Energy
Base Construction Cost:	$2,604,983	(FY86)
Total Net Discounted Savings:	$6,888,847	
SIR:	2.64	

The summary above does not include the original Family Housing ECIP which was completed under the old ECIP criteria. That ECIP has been funded and designed. It also does not include the EMCS for North Fort which was not pursued by request of the Post.

The implementation of the recommended ECIP's plus the already funded Family Housing ECIP would result in a reduction of 8% of FY75 gas use and 18% of FY75 electric use (see Figure ES2). The savings from the new ECIPs represent a reduction of 6% of FY75 gas use, 16% of FY75 electric use, and 39% of FY75 diesel fuel use, for a total reduction of 10% in FY75 energy. For FY85, the ECIPs represent a reduction of 8% in FY83 gas use, 5% in FY83 electricity use, and 4% in FY83 diesel fuel use for a total reduction of 5% in FY83 energy.

TABLE ES8

SUMMARY OF ECM'S MEETING ECIP CRITERIA FOR INCREMENT A & B

ECIP	Source Energy Savings (MBtu/yr) Natural Gas	Electric	Diesel*	Total	Base Construction Cost (FY85)	Total Net Discounted Savings	SIR	Simple Payback (Years)
T-100 Non-Family Housing Load Reducing Projects (ECIP)								
Roof Insulation	5,748	11,738	-	17,486	$425,597	$ 805,592	1.72	7.4
Automatic Setback Thermostats (5-yr Lifetime)	16,562	-	-	16,562	$ 34,815	$ 350,888	9.18	0.6
Flow-Restricting Showerheads in Barracks & BOQ's	11,211	780	-	11,991	$110,492	$ 610,291	5.03	2.8
Total for ECIP	33,521	12,518	-	46,039	$570,904	$2,219,262	3.54	3.7
T-102 Boiler Alterations (ECIP)								
Turbulators in Fire Tube Boilers (5-yr Lifetime)	8,980	-	3,564	12,544	$135,595	$ 326,207	2.19	2.4
Flue-Gas Analyzers w/Feedback Trim	5,965	-	4,247	10,212	$149,000	$ 555,555	3.39	4.3
Total for ECIP	14,945	-	7,811	22,756	$284,595	$1,179,467	3.77	3.9
T-101 Thermostat Controls and Flow Restricting Showerheads (ECIP)								
Restricted Flow Showerheads-New FH	-	2,085	-	2,085	$ 42,596	$ 90,678	1.94	6.3
Family Housing Automatic Thermostat Override	806	9,089	-	9,895	$284,328	$ 436,712	1.40	8.9
Total for ECIP	806	11,174	-	11,980	$326,824	$ 609,530	1.70	8.2
T-104 Conversion of Existing Incandescent Athletic Field Flood Lights to High-Efficiency Luminaires (ECIP)	-	14,657	-	14,657	$492,921	$ 836,798	1.55	7.5
T-103 EMCS-South(ECIP)	1,821	28,040		29,861	$409,100	$1,147,549	2.55	5.0
T-105 FM Controls	-	22,038	-	22,038	$520,639	$ 896,241	1.57	7.9
EMCS - North	704	13,668	-	14,372	$300,600	$ 517,506	1.57	---
Original Family Housing Setback Thermostats Flow Restricting Showerheads DHW Tank Insulation Lighting Conversion	9,536	11,698	-	21,234	$525,785 (CWE)	* E/C=42 B/C=2.8		

* This project was completed and funded under the old ECIP guidelines.

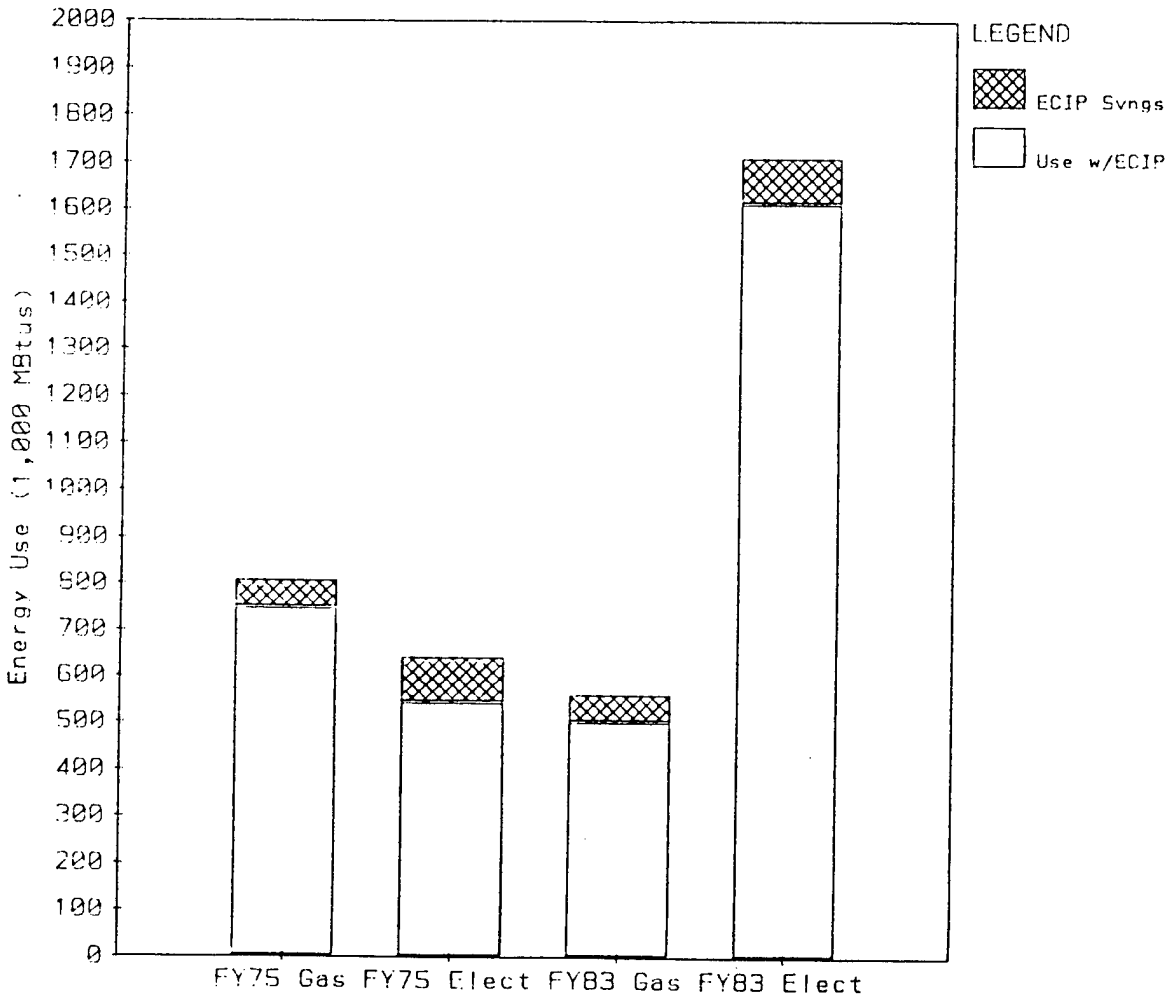


Figure ES2 Energy Reductions